

REMARKS

Reconsideration and allowance in view of the foregoing amendment and the following remarks are respectfully requested.

Claims 4-14 remain pending.

It is noted that the investigation into the potential interference is continuing. An early and favorable Decision in this regard is requested.

Claims 5 and 13 were objected to because of noted informalities. Claims 5 and 13 have been revised above to address the matters noted by the Examiner.

In view of the foregoing, reconsideration and withdrawal of the objections to claims 5 and 13 are requested.

Claims 6-9 were rejected under 35 USC 112, second paragraph, as being indefinite. Claim 6 has been revised above so as to provide clear antecedent basis to claim 5. With regard to claim 7, it is understood that the Examiner has concluded that the preamble does not require that the gas flow control valve be disposed in communication with the production string. Therefore, the final paragraph of claim 7 has been revised to state that "pressurized gas can flow" into the inlet port and out of the outlet port into "a production string". Claim 9 has also been revised to obviate the grounds for the Examiner's rejection.

Applicant notes with appreciation the Examiner's indication that claims 6-9 contain allowable subject matter and that claims 4, 5 and 10-14 are allowed. In view of the amendments presented above, early allowance of all claims is solicited.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in condition for allowance and an early Notice to that effect is earnestly solicited.

de Almeida
Serial No. 08/859,353

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Please substitute the following amended claims for corresponding claims previously presented. A copy of the amended claims showing current revisions is attached.

5. (Amended) In an oil well having a casing and a tubing with an annulus defined therebetween, an apparatus for controlling the flow of gas from said annulus into said tubing, said apparatus comprising:

a gas lift valve mounted on said tubing and having an inlet end in communication with said annulus for admitting gas from said annulus into said gas lift valve, and an outlet end in communication with an interior of said tubing, for discharging gas into said tubing;

said gas lift valve including a housing and a nozzle mounted in said housing, said nozzle being provided with a continuously open passage through which gas is allowed to flow, said passage comprising:

a convergent inlet portion through which gas flow is gradually accelerated, and a divergent outlet portion through which said gas flow [s] is gradually slowed down, thereby reducing the gas pressure loss and rendering the gas flow isoentropic.

6. (Amended) An oil well as in claim 5, further comprising:

a smooth straight intermediate portion located between said [curved] convergent inlet portion and said [tapered] divergent outlet portion, said intermediate portion providing a main restriction to said flow.

7. (Amended) In a gas lift system for injecting pressurized gas into a well having a production string, a gas flow control valve comprising:

a housing including at least one inlet port and at least one outlet port; an orifice comprising a nozzle portion and a diffuser portion;

said nozzle portion including a nozzle first end, a nozzle second end, and a nozzle flow path between said nozzle first end and said nozzle second end; said nozzle flow path converging from said nozzle first end to said nozzle second end, such that the gas experiences a decrease in pressure;

said diffuser portion including a first end and a second end, and a diffuser flow path therebetween,

said diffuser flow path diverging from said diffuser first end to said diffuser second end, such that the gas experiences a rise in pressure, said diffuser first end being disposed adjacent said nozzle second end, such that a throat is defined therebetween, said diffuser flow path being aligned with said nozzle flow path to provide a continuous flow path;

whereby [said] pressurized gas [flows] can flow into said at least one inlet port of said gas flow control valve through said continuous flow path, and out through said at least one outlet port into [said] a production string.

9. (Amended) The device of claim 7 wherein said diffuser portion has a conical contour.

13. (Amended) A method for achieving flow through a flow control valve in a well having a tubing concentrically spaced within a casing by an annulus, comprising the steps of:

placing a gas lift valve within the well, at[,] a predetermined location, said gas lift valve having an inlet end in communication with said annulus, and an outlet end in communication with an interior of said tubing;

flowing compressed gas of density less than a density of reservoir fluids into the annulus;

flowing the compressed gas from the annulus into a convergent nozzle portion of the gas lift valve;

gradually accelerating gas flow through said nozzle portion;

gradually slowing down said gas flow in a divergent outlet portion of the gas lift valve, thereby reducing the gas pressure loss and rendering the gas flow isoentropic; and

mixing gas ejected from the outlet portion of the gas lift valve with reservoir fluids in the tubing.